

CLAIMS:

1. A mammalian receptor tyrosine kinase which is a developmental tyrosine kinase (Dtk) and which is expressed in multipotential haematopoietic cells, in embryonic stem cells, in brain tissue and in testis, but which is not expressed in mature lineage-restricted haematopoietic cells.
2. A receptor tyrosine kinase according to claim 1 that is murine Dtk having the amino acid sequence of SEQ ID NO 1, or a functional equivalent thereof.
3. A receptor tyrosine kinase according to claim 1 that is mature murine Dtk having the amino acid sequence of SEQ ID NO 2.
4. A receptor tyrosine kinase according to claim 1 that is human Dtk having the amino acid sequence of SEQ ID NO 3, or a functional equivalent thereof.
5. A receptor tyrosine kinase according to claim 1 that is mature human Dtk having the amino acid sequence of SEQ ID NO 4.
6. An extracellular receptor domain of a receptor tyrosine kinase according to claim 1.
7. An extracellular receptor domain which is the extracellular receptor domain of mature murine Dtk as defined in claim 3, or a functional equivalent thereof.
8. An extracellular receptor domain of a receptor tyrosine kinase having the amino acid sequence of SEQ ID NO 5.
9. An extracellular receptor domain which is the extracellular receptor domain of mature human Dtk as defined in claim 5, or a functional equivalent thereof.

10. An extracellular receptor domain of a receptor tyrosine kinase having the amino acid sequence of SEQ ID NO 6.

5 11. An extracellular receptor domain according to any one of claims 6 to 10 which is bound or attached to a support.

10 12. A soluble receptor comprising the extracellular receptor domain of a receptor tyrosine kinase according to any one of claims 1 to 5 lacking the transmembrane region and catalytic domain of said receptor tyrosine kinase.

15 13. A nucleic acid molecule encoding a receptor tyrosine kinase as defined in claim 1.

20 14. A nucleic acid molecule encoding murine Dtk or a functional equivalent thereof as defined in claim 2.

25 15. A nucleic acid molecule according to claim 14 which is DNA.

30 16. A DNA molecule according to claim 15 having the nucleotide sequence of SEQ ID NO 7.

17. A nucleic acid molecule encoding mature murine Dtk as defined in claim 3.

25 18. A nucleic acid molecule according to claim 17 which is DNA.

19. A DNA molecule according to claim 18 having the nucleotide sequence of SEQ ID NO 8.

30 20. A nucleic acid molecule encoding human Dtk or a functional equivalent thereof as defined in claim 4.

21. A nucleic acid molecule according to claim 20 which is DNA.

22. A DNA molecule according to claim 21 having the nucleotide sequence of SEQ ID NO 9.
23. A nucleic acid molecule encoding mature human Dtk as defined in claim 5.
24. A nucleic acid molecule according to claim 23 which is DNA.
25. A DNA molecule according to claim 24 having the nucleotide sequence of SEQ ID NO 10.
26. A nucleic acid molecule encoding an extracellular receptor domain as defined in claim 6.
27. A nucleic acid molecule encoding the extracellular receptor domain of murine Dtk or a functional equivalent thereof as defined in claim 7.
28. A nucleic acid molecule according to claim 27 which is DNA.
29. A DNA molecule according to claim 28 having the nucleotide sequence of SEQ ID NO 11.
30. A nucleic acid molecule encoding the extracellular receptor domain of human Dtk or a functional equivalent thereof as defined in claim 9.
31. A nucleic acid molecule according to claim 30 which is DNA.
32. A DNA molecule according to claim 31 having the nucleotide sequence of SEQ ID NO 12.
33. A vector including a DNA molecule as defined in claim 13.

34. A vector including a DNA molecule as defined in any one of claims 15, 16, 18 and 19.

5 35. A vector including a DNA molecule as defined in any one of claims 21, 22, 24 and 25.

10 36. A vector including a DNA molecule as defined in claim 28 or claim 29.

15 37. A vector including a DNA molecule as defined in claim 31 or claim 32.

38. A method of producing a receptor tyrosine kinase comprising the steps of:

- (a) culturing a host cell which has been transformed or transfected with a vector as claimed in any one of claims 33-35 to express the encoded receptor tyrosine kinase; and
- (b) recovering the expressed receptor tyrosine kinase.

20 39. A method of producing an extracellular receptor domain of a receptor tyrosine kinase comprising the steps of:

- (a) culturing a host cell which has been transformed or transfected with a vector as claimed in claim 36 or claim 37 to express the encoded extracellular receptor domain; and
- (b) recovering the expressed extracellular receptor domain.

25 40. A recombinant receptor tyrosine kinase which is the product of a method as defined in claim 38.

30 41. A recombinant extracellular receptor domain which is the product of a method as defined in claim 39.

42. A ligand that binds to a receptor tyrosine kinase as defined in claim 1.

43. A ligand that binds to a receptor tyrosine kinase as defined in claim 2.

44. A ligand that binds to a receptor tyrosine kinase as defined in claim 3.
45. A ligand that binds to a receptor tyrosine kinase as defined in claim 4.
- 5 46. A ligand that binds to a receptor tyrosine kinase as defined in claim 5.
47. A ligand that binds to an extracellular receptor domain of a receptor tyrosine kinase as defined in claim 6.
- 10 48. A ligand that binds to an extracellular receptor domain of a receptor tyrosine kinase as defined in claim 7.
49. A ligand that binds to an extracellular receptor domain of a receptor tyrosine kinase as defined in claim 8.
- 15 50. A ligand that binds to an extracellular receptor domain of a receptor tyrosine kinase as defined in claim 9.
51. A ligand that binds to an extracellular receptor domain of a receptor tyrosine kinase as claimed in claim 10.
- 20 52. A ligand that binds to an extracellular receptor domain of a receptor tyrosine kinase as claimed in claim 11.
- 25 53. A ligand that binds to a soluble receptor as defined in claim 12.
54. A ligand that binds to a receptor tyrosine kinase as claimed in claim 40.
- 30 55. A ligand that binds to an extracellular receptor domain as claimed in claim 41.

- 5 56. A ligand according to any one of claims 42-55 wherein the ligand stimulates the proliferation, differentiation and/or survival of cells which express a receptor tyrosine kinase according to claim 1.
- 10 57. A ligand according to any one of claims 42-55 wherein the ligand is antagonistic and at least partially blocks or inhibits the function of a receptor tyrosine kinase according to claim 1 through binding to said receptor.
- 15 58. A method of stimulating the proliferation, differentiation and/or survival of a cell expressing a receptor tyrosine kinase according to claim 1 comprising contacting the cell with a ligand according to claim 56.
- 20 59. A method according to claim 58 wherein the stimulation occurs *in vivo*.
- 25 60. A method according to claim 58 wherein the stimulation occurs *ex vivo*.
- 30 61. A method of inhibiting the function of a receptor tyrosine kinase according to claim 1 comprising contacting the receptor with a ligand according to claim 57.
- 35 62. A method according to claim 61 wherein the inhibition occurs *in vivo*.
- 40 63. A method according to claim 61 wherein the inhibition occurs *ex vivo*.
- 45 64. A method of treating a disease, syndrome or condition caused or mediated by an excess of a ligand as claimed in claim 56 comprising the step of contacting said excess of said ligand with an effective amount of a receptor tyrosine kinase according to any one of claims 1-5 and 40, an extracellular receptor domain according to any one of claims 6-11 and 41 or a soluble receptor according to claim 12.
- 50 65. A method of treating a disease, syndrome or condition caused or mediated by an excess of a ligand as defined in claim 57 comprising the step of contacting said excess of said ligand with an effective amount of a receptor tyrosine kinase

according to any one of claims 1-5 and 40, an extracellular receptor domain according to any one of claims 6-11 and 41 or a soluble receptor according to claim 12.

5 66. A method of extracting a ligand as defined in claim 56 or claim 57 from a medium which may contain said ligand comprising the step of contacting said medium with a receptor tyrosine kinase according to any one of claims 1-5 and 40, an extracellular receptor domain according to any one of claims 6-11 and 41 or a soluble receptor according to claim 12.

10 67. A method of isolating ligand(s) as defined in claim 56 or claim 57 from a medium which may contain said ligand(s), comprising the steps of:

- (a) contacting said medium with an effective amount of a receptor tyrosine kinase according to any one of claims 1-5 and 40, an extracellular domain according to any one of claims 6-11 and 41 or a soluble receptor according to claim 12;
- (b) detecting which ligand(s) bind to said tyrosine kinase receptor, extracellular receptor domain or soluble receptor; and
- (c) isolating such bound ligand(s).

15 68. A ligand which is isolated by a method according to claim 67.

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